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BIOLOGICAL FACT
AND THE
STRUCTURE OF SOCIETY

THE HERBERT SPENCER LECTURE

DELIVERED AT THE EXAMINATION SCHOOLS
ON WEDNESDAY, FEBRUARY 28, 1912

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BIOLOGICAL FACT AND THE STRUCTURE OF SOCIETY

THERE are signs that the civilized world is at length awakening to the fact that the knowledge needed for the right direction of social progress must be gained by biological observation and experiment. Such a turn in public opinion would, we may be sure, have been viewed by Herbert Spencer with exceptional interest and approval. The truth, so obvious to the naturalist, that man is an animal, subject to the same physical laws of development as other animals, is a doctrine he constantly expounded, and perhaps his teaching did more than that of any other philosopher towards helping men to see themselves as they really are, stripped of the sanctity with which superstition and ignorance have through all ages invested the human species.

Spencer not only contributed that great service, but I suppose that no one ever looked forward with serener confidence or a fuller optimism to the consequences which follow upon a recognition of these natural facts, to the possibility of a further evolution of our species, and to the certainty that by his own action the destiny of man may be controlled. It is natural therefore that in a lecture founded to commemorate his work we should examine the possibilities of biological discovery as applied to the constitution and future of human society.

Many causes have combined to give prominence at this moment to the biological aspects of Sociology. There exists a general perception on the part of the more intelligent that the present condition of the social

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structure in civilized states is one of extreme instability. The apprehension that changes of exceptional magnitude are impending is widely spread. In addition to these indefinite sensations of uneasiness, the minds of observant persons are becoming keenly alive to the fact that the unexampled changes in the conditions of human life, made possible by the applications of science, are likely to result in an alteration of the composition of the population. Owing to the control which civilized communities have acquired over the forces of nature the average human life has been materially lengthened, and we need no evidence beyond that of ordinary experience to show that especially have the lives of those who are defective in mind or body been prolonged by application of these new powers on their behalf.

A general acquaintance with the idea of Evolution, in outline at least, has become universal. We are all habituated to the notion that the form of a society, like that of an individual, is a consequence of an evolutionary process. To that process experimental interference on an enormous scale is being applied, and it is inevitable that the community at large should be asking, not without anxiety, how far the outcome of these interferences with what have usually been regarded as natural forces will bring good or evil to the societies which attempt them. Within the last few years, moreover, mankind has suddenly begun to realize what heredity means. The deliberate interferences hitherto contemplated by economists have related to the distribution of wealth and opportunities of many kinds, the regulation of supply and demand, the creation or abolition of divers political institutions, and other measures of similar character. Though the effects of these devices are commonly described as profound, such measures are indirect, and

to the mind of the naturalist most of them are essentially superficial. Every legislative encouragement given to one class and every repression of another has an effect on the future of the race. Exerted over long periods of time, these interferences must indeed influence the composition of a population; but with knowledge of the full meaning of the physiological process of heredity we perceive that man has it in his power to operate upon his species in a much more drastic way. In Spencer's time and long before, this fact was obvious to all who reflected on the matter. He himself in many passages alludes to these possibilities. In 1873, for example, he wrote:[1]

'If any one denies that children bear likenesses to their progenitors in character and capacity—if he holds that men whose parents and grandparents were habitual criminals, have tendencies as good as those of men whose parents and grandparents were industrious and upright, he may consistently hold that it matters not from what families in a society the successive generations descend. He may think it just as well if the most active, and capable, and prudent, and conscientious people die without issue; while many children are left by the reckless and dishonest. But whoever does not espouse so insane a proposition must admit that social arrangements which retard the multiplication of the mentally-best, and facilitate the multiplication of the mentally-worst, must be extremely injurious.'

In the period when these words were written practically nothing was known of heredity. Naturalists knew that in general offspring resemble their parents more or less, and that by selection for an indefinite number of generations types could be fixed so as to breed approximately true. That there was a vast province of exact

[1] *The Study of Sociology*, ed. 1908, p. 343.

and readily ascertainable knowledge, fraught with immeasurable practical consequence to mankind, hidden behind the word *heredity* had occurred to scarcely a single mind.

Many were perfectly aware of the importance of heredity. All upholders of evolutionary doctrines, both those who preceded Darwin and those who followed him, were familiar with the fact that change of type came about through the inheritance of modification. In many admirable and striking works the late Francis Galton had endeavoured to direct attention to the practical significance of heredity. He had shown also that the descent of characters could be partially expressed in a system, which, though erroneous in fundamental conception, still gives an approximately correct representation of several of the phenomena.

But the discovery of Mendelian analysis, though as yet imperfectly developed, opens up a new world of physiology. Expressed in the briefest possible way the essence of the Mendelian principle is not difficult to grasp. It may be conveyed in the statement that organisms may be regarded as composed to a great extent of separate factors, by virtue of which they possess their various characters or attributes. These factors are detachable, and may be recombined in various ways. It thus becomes possible to institute a factorial analysis of an individual.

How far such analysis can be carried we do not yet know, but we have the certainty that it extends far, and ample indications that we should probably be right in supposing that it covers most of the features, whether of mind or body, which distinguish the various members of a mixed population like that of which we form a part. From such a representation we pass to the obvious con-

clusion that an individual parent is unable to pass on to offspring a factor which he or she does not possess.

Just as various features or characteristics may be due to the *presence* of the corresponding factor, so we have to recognize that other attributes appear only in the *absence* of certain factors. Moreover, since those individuals only which are possessed of the factors can pass them on to their offspring, so the offspring of those that are destitute of these elements do not acquire them in subsequent generations but continue to perpetuate the type which exists by reason of the deficiency. You will readily understand that in practice the analysis and detection of these factors is a difficult matter. The difficulty arises especially from the very important fact that some of the ingredient-factors have the property of *inhibiting* or masking the effects of other factors, and that many features of bodily organization are due to the *combination* and interaction of two or more ingredients, which alone might be present without producing any perceptible sign of their presence. Thus one flower may be white, because it is lacking in the element which produces colour; but another may be white though it has everything needed to give it colour, because it has in addition an element which suppresses the pigmentation. Again, colour in some plants is due to one factor, but in others it is developed only when two independent complementary factors are present, and either of these may be present alone in a flower which is perfectly white.

Such rules have been demonstrated in operation for an immense diversity of characteristics in both animals and plants in great variety. It should be explicitly stated, however, that in the case of the ordinary attributes of normal men we have as yet unimpeachable evidence

of the manifestation of this system of descent for one set of characters only, namely the colour of the eyes.

There is nevertheless no reasonable doubt that the extension to the normal attributes of man is one which we are well entitled to make. For with the doubtful exception of certain features of quantity, size, and number, no characters of animals and plants which have been made subject to adequate experimental tests have hitherto proved incapable of being represented as governed by such a system. Moreover, if the evidence as to normal characteristics of man is defective—which in view of the extreme difficulty of applying accurate research to normal humanity is scarcely surprising—there is in respect of numerous human abnormalities abundant evidence that a factorial system of descent is followed.

To appreciate the full significance of these things one must have practical experience of breeding. I wish it were in my power to bring to the minds of such an audience as this some part of the emotion which the contemplation of this display of order can excite. Imagine a greenhouse stage full of a miscellaneous collection of varieties of some plant, such as the Chinese Primula, with all their varied shapes of leaves and flowers. Their colours also seem at first sight to range through an endless series of tints of magenta, crimson, pink, and blue. By appropriate treatment we have it in our power to determine that in three generations at the most the offspring of these plants, the generation in fact which will then replace them and represent them, shall be entirely of one type only, or of two types, or three types in any required proportion. By choosing which parents shall leave offspring we can decide how the species shall be represented on our stages with a certainty almost as great as if the selection were made from plants

already grown. And similarly for fowls and many other forms of life. Write *Man* for Primula or fowl, and the stage of the world for that of the greenhouse, and I believe that with a few generations of experimental breeding we should acquire the power similarly to determine how the varieties of men should be represented in the generations that succeed.

At a cattle-show I look at the splendid animals in their pens, ranged breed by breed, and I look at the farmers and the sight-seers passing by them in procession. They too are of manifold types, men from all parts of the country, often showing the characteristics of their race plain and easy to recognize—big men, little men, men who fill out or 'mature' early, as they say in the meat-market—spare men, that the farmers would call 'bad doers', tame men, vicious men, sharp and dull, dark and fair—shepherds, stock-men, grooms, butchers, and sales-men. Could they too be arranged breed by breed in pens? A few most certainly could. (We might make a pen of shepherds and we should not often put in a groom by mistake.) Why could not all be sorted into breeds? The answer is obvious: because they are the offspring of matings made almost at random—and for no more recondite reason.

Many are disposed to imagine that the conditions of life play a great part in producing the diversity of such a mixed assemblage, but the more we learn of biological fact the less do we find much evidential ground for that opinion. The conditions of life provide opportunity for the development of characters, but they cannot increase the original endowment. If the right opportunity be withheld the characteristic does not appear. If the stout man had been starved from his birth, obviously his disposition to stoutness might have remained unknown;

but the spare man, like the razor-back pigs of the Southern States, will not fatten though he take five meals a day. And so for qualities that may be regarded as more subtle. A muscat grape will produce its aromatic flavour if it have sun and a suitable soil,—the pretentious Gros Colmar, with its fruits half as large again, is not worth eating, though it be fostered with all the gardener's skill. These qualities are, as we say, *genetic*, given to the creature at its birth, brought into it on fertilization by one, or by the other, or by both of the cells which united to produce it. That the conclusions to which experimental studies of animals and plants have led us apply also on the whole to the descent of human faculty can be doubted by no one who has studied the evidence.

If any one is not already convinced he should refer to the accumulated proofs which Galton so successfully collected, especially in *Hereditary Genius*. Let him study any biographical records of human achievement or conduct—such as a dictionary of painters or of musicians—and observe the perpetual recurrence of the same names in groups of two, three, or more; or the geographical distribution of illegitimacy, showing as it does the maintenance of 'local custom' and morals under divers conditions of occupation, soil, and climate; or the pedigrees collected in medical literature showing the descent of disease; or if he look no further than the distribution of qualities among the families known to himself he will be forced to the admission that, though the circumstances among which a man is born or thrust have some influence in the development and direction of his powers, yet the total contribution which circumstance makes to achievement is of that subordinate kind which is adequately described by the word 'opportunity'.

Men do not gather grapes of thorns or figs of thistles;

and what is so clear for the budding branches of the plant would be no less obviously true of the branching generations of our species, were it not for the fact that we each of us come from the union of *two* cells derived from two parents. The fact that we arise by this sexual process throws, however, but a thin veil of obscurity over the laws of descent, and it is interesting to notice that if only human or any other pedigree-tables had been arranged to be read *downwards instead of upwards*, the essential fact of Mendelian segregation must have been long ago discovered in regard to many characteristics. Genealogists have been accustomed to make a table of descent as a fan, with its apex in the individual whose origin they wish to display and its base widening as far as possible into the ancestry, the parental stock of each ancestor being represented by a pair. But to show how a character really descends we require the table constructed with its apex in one original individual who possessed the character, and from that apex to exhibit the devolution of that character among the diverging branches of his posterity. As the usual purpose of the genealogist has been to contribute either to political history or to family pride, rather than to natural knowledge, his mind has consequently been set on a demonstration rather of the origin and antiquity of his hero's qualities than of their distribution or absence among the collaterals.

I do not propose on this occasion to adduce facts in support of the general proposition that human genetic physiology follows in the main systems similar to those discovered in animals, but rather, assuming that this truth is admitted, to examine some phenomena of social physiology as they appear in the light of this knowledge.

May I clear myself at once of a possible misunderstanding? You will think, perhaps, that I am about to advocate interference by the State, or by public opinion, with the ordinary practices and habits of our society. There may be some who think that the English would be happier if their marriages were arranged at Westminster instead of, as hitherto, in Heaven. I am not of that opinion, nor can I suppose that the constructive proposals even of the less-advanced Eugenists would be seriously supported by any one who realized how slender is our present knowledge of the details of the genetic processes in their application to man. Before science can claim to have any positive guidance to offer, numbers of untouched problems must be solved. We need first some outline of an analysis of human characters, to know which are due to the presence of positive factors and which are due to their absence; how and in respect of what qualities the still mysterious phenomenon of sex causes departures from the simpler rules of descent, and many other data which will occur readily enough to those who are familiar with these inquiries. It is almost certain, for instance, that some qualities are transmitted differently according as they are possessed by the mother or by the father, and it is by no means improbable that various forms of conspicuous talent are among their number. It should be borne in mind that we do not yet know even which females among mankind correspond to which males. In man sexual differentiation is generally strongly marked. The case is almost like that of poultry. If a breeder ignorant of the breeds of poultry were asked to sort a miscellaneous assemblage of cocks and hens into pairs according to breed, he would often be quite at a loss to know what a given male type looked like when represented in a hen, and conversely. He would thus

make many mistakes even when dealing with pure breeds; and in man, as individuals pure-bred in any respect are very rare, the operation would be far more difficult. For these and other reasons I am entirely opposed to the views of those who would subsidize the families of parents passed as unexceptionable. Galton, I know, contemplated some such possibility; but if we picture to ourselves the kind of persons who would infallibly be chosen as examples of 'civic worth'—the term lately used to denote their virtues—the prospect is not very attractive. We need not for the present fear any scarcity of that class, and I think we may be content to postpone schemes for their multiplication.

As regards practical interference there is nevertheless one perfectly clear line of action which we may be agreed to take—the segregation of the hopelessly unfit. I need not argue this point. When it is realized that two parents, both of gravely defective or feeble mind, in the usual acceptance of that term, *do not have any normal children at all*, save perhaps in some very rare cases, and that the offspring of even one such parent mated to a normal generally contain a proportion of defectives,[1] no one can doubt that the right and most humane policy is to restrain them from breeding, and I suppose the principle of the Act now before Parliament for the institution of such a policy will have general approval. Under our present system the State exerts

[1] From such pedigrees as I have seen I should nevertheless hesitate to describe feeble-mindedness as a simple Mendelian recessive. It is possibly due to an absence of some factor or factors; but there is strong evidence that the usual result of a mating between normal and feeble-minded parents is a proportion of feeble-minded children, and it is difficult to suppose that most ostensibly normal persons are heterozygous in this respect. See especially H. H. Goddard, *Amer. Breeder's Magazine*, 1910, i. 172.

all the powers which science has developed for the preservation of such persons from their birth, most of whom would otherwise perish early. Brought to maturity their destiny is not difficult to imagine. However ignorant we may be as to the several ingredients which are required to compose a stable society, or of the proportions in which they are severally desirable, we are safe in preventing these creatures from reproducing themselves. Some of the more advanced of the American States are already going further, and even such a representative of older ideas as the State of New Jersey is, I am informed, introducing the practice of sterilizing criminals of special classes. That appears to me the very utmost length to which it is safe to extend legislative interference of this kind, until social physiology has been much more fully explored.

Beyond that if there is authority to go, it is not drawn from genetic science. If a person who is born with cataract, or develops cataract very early in childhood, has children, it is almost certain that half those children will inherit the cataract, with varying degrees of blindness. The prospect is more or less the same for several other defects. Nevertheless, though from these causes many remain grievous burdens to their families, or to the public funds, and though they could probably be eliminated after a few generations without difficulty by legislative interference, that would be a very dangerous course. They are not necessarily useless persons, nor are their own lives necessarily miserable. There are many healthy and active types which are a far greater nuisance to their neighbours and reproduce themselves with equal exactitude. Possibly, on a ballot, few of us would be encouraged to perpetuate our likenesses! We all have grave defects, not least those

who contribute much to the happiness of the world. The monogamous pigeons sitting on the barn roof perhaps are scandalized at the polygamy of the fowls in the yard. Such decadence, they hold, is disgusting and should be stopped. The fowls no doubt would reply that they may be polygamous and even polyandrous, but as for decadence, they at least don't limit their families to two. Such degeneracy is race-suicide and they think it should be punished. And so the debate might continue.

Seriously, let us remember that a polymorphic and mongrel population like ours descends from many tributary streams. We are made of fragments of divers races, all in their degree contributing their special aptitudes, their special deficiencies, their particular virtues and vices, and their multifarious notions of right and wrong. Many of us have, for instance, the monogamous instinct as strong as pigeons, and many of both sexes have it no more than fowls. Why should some be ambitious to make all think or act alike? It is much better that we should be of many sorts, saints, nondescripts, and sinners. Posterity is likely to discover that to eliminate sinners there is only one way—that which St. Paul pointed to us when he wrote that 'where no law is, there is no transgression'. Science knows nothing of sin save by its evil consequence. In all reverence she inverts the ancient saying and proclaims that the sting of Sin is Death. It is not the tyrannical and capricious interference of a half-informed majority which can safely mould or purify a population, but rather that simplification of instinct for which we ever hope, which fuller knowledge alone can make possible. As science strengthens our hold on nature, more and more will man be able to annul the evil consequence of sin. Little by little

the law will lapse into oblivion, and sins which it created will be sins no more.

The great and noble work which genetic science can do for humanity at the present time is to bring men to take more true, more simple, and, if so inexact a word can be used intelligibly, more natural views of themselves and of each other. With fuller knowledge of the physiology of races, and of the intimate relation between the physiological composition of the individual and his vital possibilities, all the problems of social organization show new aspects, and the vision is cleared of the fancies with which subjective ingenuity has overlaid the facts. How hard it is to realize the polymorphism of man! Think of the varieties which the word denotes, merely in its application to one small society such as ours, and of the natural, genetic distinctions which differentiate us into types and strains—acrobats, actors, artists, clergy, farmers, labourers, lawyers, mechanics, musicians, poets, sailors, men of science, servants, soldiers, and tradesmen. Think of the diversity of their experience of life. How few of these could have changed parts with each other. Many of these types are, even in present conditions, almost differentiated into distinct strains. In no wild species, not even among the ants, so often quoted, do we find any polymorphism approaching to this. I never cease to marvel that the more divergent castes of civilized humanity are capable of interbreeding and of producing fertile offspring from their crosses. Nothing but this paradoxical fact prevents us from regarding many classes even of Englishmen as distinct species in the full sense of the term. In a strident passage the acute Cobbett long ago expanded this conclusion:

'I am quite satisfied, that there are as many *sorts* of men as there are of dogs. . . . It cannot be *education* alone that makes the amazing difference we see. Besides, we see men of the very same rank and riches and education differing as widely as the pointer does from the pug. The name, *man*, is common to all the sorts, and hence arises very great mischief. What confusion must there be in rural affairs, if there were no names whereby to distinguish hounds, greyhounds, pointers, spaniels, terriers, and sheep-dogs from each other! And what pretty work, if, without regard to the *sorts* of dogs, men were to attempt to *employ them*! Yet this is done in the case of *men*! A man is always a *man*; and without the least regard as to the sort, they are promiscuously placed in all kinds of situations. . . . What would be said of the 'Squire who should take a fox-hound out to find partridges for him to shoot at? Yet would this be *more* absurd than to set a man to law-making who was manifestly formed for the express purpose of sweeping the streets or digging out sewers?'[1]

The problem which confronts the political philosopher is to find a system by which these differentiated elements may combine together to form a co-ordinated community, while each element remains substantially contented with its lot. To discuss this mighty problem in its full scope I have neither qualification nor desire. All that I can venture to contribute are some reflections which must come often to the minds of naturalists who contemplate the facts. They may be familiar enough to those who engage in the study of human affairs, but I have noticed that among those natural divisions between the sorts of men to which I just referred there are few more marked than that which usually separates students of natural knowledge from those who care nothing for it; and with rare exception you will find that publicists of the various denominations are almost always in this latter

[1] W. Cobbett, *Rural Rides*, ed. 1853, p. 291.

group.[1] Legislators, nevertheless, whether they know it or not, are engaged in a practical experiment with living things of a peculiarly intricate kind.

Many features of social phenomena evidently wear to the legislator aspects entirely different from those which they present to us. Lately, for example, the nation has been debating the virtual abolition of the hereditary Chamber—obviously a problem to the solution of which biological data are essential. I did not see in the public utterance of any statesman an allusion even to this aspect of the matter. Yet such data are neither very difficult to collect nor to interpret.

Let us think of the criminal law and consider how a system can satisfy the legislator which to the naturalist is stupid and infamously cruel. Just now I spoke of the polymorphism of mankind. No one trained in biology is ignorant of that phenomenon. True we realize it now as we never did before the study of heredity had developed, and I doubt not that before many years are past genetic research will have successfully represented the varying compositions of many at least of the more aberrant types of men by irrefutable analysis. If we have not yet these exact expressions, none of us doubt they can be found. Yet 'in the sight of the law', as the phrase goes, all men are equal! Are they equal

[1] Mr. Canning did not learn till late in life that tadpoles turn into frogs, and thought that a schoolboy who gave him that information was fooling him. Mr. Gladstone believed that twenty-eight was the normal total for the human teeth. Portentous ignorance of this kind is common among historians and legislators. In itself perhaps a trifle, it is a symptom of detachment from the actual world so complete as to disqualify a man from safely exercising high functions of statesmanship, demanding, as they must, a discernment which can only come from wide knowledge of natural fact.

in the sight of any one less blind than Justice? We do not find them equal in the out-patient room, in the school, at the recruiting dépôt—why in the court of law? If a lawyer cares to know how criminal procedure looks to biologists, let him read the sentence pronounced in *Erewhon*[1] by the judge on the prisoner convicted 'of the great crime of labouring under pulmonary consumption'. After expressing the pain he felt at having to pass a severe sentence on one who was yet young, and had otherwise excellent prospects, he continued:

'You were convicted of aggravated bronchitis last year: and I find that though you are now only twenty-three years old, you have been imprisoned on no less than fourteen occasions for illnesses of a more or less hateful character; in fact, it is not too much to say that you have spent the greater part of your life in jail. It is all very well of you to say that you came of unhealthy parents, and had a severe accident in your childhood which permanently undermined your constitution; excuses such as these are the ordinary refuge of the criminal; but they cannot for one moment be listened to by the ear of justice. I am not here to enter upon curious metaphysical questions as to the origin of this or that—questions to which there would be no end were their introduction once tolerated, and which would result in throwing the only guilt on the tissues of the primordial cell, or on the elementary gases. . . . I do not hesitate therefore to sentence you to imprisonment, with hard labour, for the rest of your miserable existence.'

A humane man—a lawyer too—after witnessing such a scene, not in *Erewhon* but in London, said once to me that he did think the judge might have noticed that the prisoner's head was a different shape from anybody else's in the court. The sickening cruelty of the courts is, I am happy to think, abating somewhat, but there will be no radical improvement until the functions of the

[1] *Erewhon*, by Samuel Butler, 1872, p. 96.

administrator of criminal justice are recognized as in the main medical. The criminal may be and often is hopeless; but if his case be one for treatment, let us treat it with the only remedies capable of doing any good. Give him occupation, distraction, change of thoughts, if it be possible. These, and not solitary confinement, are the treatment we should prescribe for ourselves when we fear temptation.

Take the two converse aspects of the question of population. Infant mortality is conventionally regarded by both statesmen and philanthropists as deplorable, without further inquiry.[1] Do they consider from what prospect most of these infants are delivered? Would it be better that they should be preserved to fill the workhouse infirmaries?

Other public men profess indignation against the practice, almost universal among the more intelligent and more provident classes in civilized countries, of limiting their families to two or three children. Have these patriots estimated what the pressure upon the

[1] Such an infatuation does this idea become even with statistical experts, that I find so careful a writer as Dr. Newsholme saying without qualification 'that each member of the population, when the balance between expense of subsistence and wages earned through life is worked out, represents enormous wealth'. This passage is introduced with the words 'It has been already pointed out'; but even in the place where the subject is more fully treated and Farr's calculations are given, the only reservation overtly made is for the aged. Dr. Newsholme of course means that on an average of the population there is a balance of profit, and on an average of wage-earners a high profit, not that 'each member of the population . . . represents enormous wealth'. Yet that section of the population whose value is negative should be constantly and explicitly mentioned; for there is nothing to show that a reduction in total population is incompatible with an equal or even greater profit on the whole. (See Newsholme, A., *Elements of Vital Statistics*, 1889, pp. 69 and 14.)

resources of the country would be if we mostly had six to ten children, as our parents had? The naturalist knows that a great part of the population of this country ought not to exist at all under present conditions of distribution. To add greatly to the number even of the able and thrifty will not diminish the proportion of the unfit or lighten the strain. What would be thought of a breeder who tried to keep all his stock? He wants no more than he can do well; otherwise his stock and he too will soon be ruined. The distinction which Malthus drew between 'a redundant population and one actually great' is sound, biologically as well as in economics. It is not the *maximum* number but the *optimum* number, having regard to the means of distribution, that it should be the endeavour of social organization to secure. To spread a layer of human protoplasm of the greatest possible thickness over the earth—the implied ambition of many publicists—in the light of natural knowledge is seen to be reckless folly. We need not more of the fit, but fewer of the unfit. A high death-rate is often associated with a high birth-rate, but happily a low birth-rate and a low death-rate are quite compatible with each other.

In the gloom which shrouds the future of civilized communities there is one fact which gives encouragement and hope, the decline in the birth-rate, associated as it now is with a decline in the death-rate also.

To most writers on these questions continual increase of the population of a country is regarded as the normal condition of things. This proposition is explicitly stated, for example by Rümelin,[1] in one of the leading text-

[1] '... so erscheint es nicht nur als empirische Tatsache sondern als die Ordnung der Natur, dass die Geburten in jeder menschlichen Gesellschaft einen Ueberschuss über die Todesfälle ergeben,

books. The naturalist knows, however, that such a phenomenon can be but ephemeral. He is accustomed to take longer views of the life of a species. In nature the numbers of a species can only increase when it is taking up fresh means of subsistence, in consequence of variation or otherwise. Parasites increase when they invade a new host. The rabbits increased when they invaded Australia, as did the sparrows in America. The population of this country increased very slowly till the latter half of the eighteenth century, when it began to rise sharply, but it was in the first third of the nineteenth century that the rate of increase became alarming, culminating in the misery of the forties.[1]

No one can doubt that the new means of subsistence which made this rise in population possible was the energy latent in the coal-fields. Nor have we to look far for the variation which enabled man to begin thus to devour the capital of the earth; and I suppose the coincidence of the first quick rise in population with the activities of that remarkable mutation, James Watt, needs

somit die *stetige Zunahme einer Bevölkerung* als die Normale, der Stillstand oder Rückgang stets als etwas Naturwidriges, als eine krankhafte, durch ausserordentliche Umstände begründete Störung zu gelten hat.' Rümelin, in Schönberg's *Handb. Polit. Oekon.*, 1890, i. 772.

[1] Sir A. Alison, *The Principles of Population*, 1840, i. 520: 'It is in the midst of this prodigious manufacturing population that the human race advances with alarming rapidity, and shoals of human beings are ushered into the world without any adequate provision existing for their comfortable maintenance. Such is the improvidence, the recklessness, and the profligacy which characterize the great bulk of the urban population in all the great cities of the empire, that the rate of increase bears no proportion to the permanent demand for labour: but mankind go on multiplying, as in the Irish hovels, with hardly any other limit than that arising from the physical inability in the one sex to procreate, and in the other to bear children.'

no special emphasis of interpretation. Sir William Ramsay estimates that the coal of this country will be exhausted in 175 years, and in his opinion it is in the highest degree improbable that any comparable source of energy will become available.[1] He limited his remarks to this country; but though there is no reliable means of estimating the coal in the earth as a whole, it is probable that within some period which is short as biology counts time, our species will be once more limited to the energy-income of the earth. We are in fact passing through a phase which is quite exceptional in the history of a species—exceptionally favourable if you will—and it is in a decline in the birth-rate that the most promising omen exists for the happiness of future generations.

Professor Marshall, discussing not the consequences of the exhaustion of coal, but another phase of the population question, remarks: 'It remains true that unless the checks on the growth of population in force at the end of the nineteenth century are on the whole increased (they are certain to change their form in places that are as yet imperfectly civilized) it will be impossible for the habits of comfort prevailing in Western Europe to spread themselves over the whole world and maintain themselves for many hundred years.' In a note to this passage he estimates that if the present rate of increase of human population continue till the year 2400 'the population will then be 1,000 for every mile of fairly fertile land: and so far as we can foresee now, the diet of such a population must needs be in the main vegetarian '.[2]

And now regarding the central problem of social

[1] *Presidential Address to British Association*, Portsmouth, 1911. This estimate followed that of the Coal Commission in excluding coal below 4,000 feet, which, if included, would prolong the period for perhaps a century.

[2] Alfred Marshall, *Principles of Economics*, third ed., 1895, p. 259.

structure, the conditions of stability in the relations of the human classes to each other and to the State, has biological science any counsel of value to give? Is there any observation that naturalists have made, knowledge acquired, or principles perceived in their study of the manifold forms of life, which in this period of grave anxiety they dare to offer as a contribution to political philosophy? Let us examine the physiological aspects of that problem. Upon the data there is now an agreement almost universal. Society consists of differentiated elements, unlike in tastes, faculties, sex, health, and ability of every kind. Some are strong, most are weak. If this complexity of civilization—the indispensable condition of evolutionary progress—is to continue, such differentiation, or some state approaching it, must be preserved. How then, in an age when knowledge is cheap and all know how the rest live, is any general content to be secured? Let us turn to the familiar comparison in which the community is likened to an organism with differentiated parts. The comparison is as old as Menenius Agrippa, or at least as Plutarch. It was one, too, which Herbert Spencer especially delighted to develop. Note next that to the biologist this presentation of the phenomenon is not a mere analogy but often a description of fact. The comparative anatomist cannot always draw a clear distinction between a compound organism with differentiated parts and a social organism with differentiated members.

I lay stress on this aspect of the social problem because I have seen several times of late the claim put forward that the teaching of biological science sanctions a system of freest competition for the means of subsistence between individuals, under which the fittest will survive and the less fit tend to extinction. That may

conceivably be a true inference applicable to forms which, like thrushes, live independent lives, but so soon as social organization begins, the competition is between societies and not between individuals. Just as the body needs its humbler organs, so a community needs its lower grades, and just as the body decays if even the humblest organs starve, so it is necessary for society adequately to ensure the maintenance of all its constituent members so long as they are contributing to its support. The simple hydroids, such as *Tubularia*, live alone, and no doubt compete freely against each other; but hydroids which remain united as compound forms have to let the food circulate among those degraded components which never even develop mouths, and all their lives function as tentacles. A body all muscle would be as helpless as a nation of Sandows; nor would a nation of Newtons live much longer than a brain removed from the skull.

From these considerations we may draw a conclusion that some elements of the doctrines vaguely described as socialism are consistent with, and indeed are essential to, stability. Society would do well to restrain competition between its parts so far as to ensure proper food and leisure for the lower grades of producers. How that restraint is to be effected is a question for the practical economist. Some such measures of restraint we have already enacted: on the whole with good results. Spencer, as every one knows, protested with vehemence against this legislation, but I have never been able to comprehend the biological grounds on which he based his protest. For if society is in reality an organism, society must apply restraints on the undue growth of its parts analogous to that co-ordinating mechanism which controls the growth of organs in the body.

Apart also from actual restraint by civil authority, there is happily hope of some effective restraint by change in public feeling.

Formerly, cruelty to domesticated animals was defended on the principle that 'a man may do what he likes with his own'. Civilized humanity no longer recognizes that defence; and slowly, even in our dealings with the weaker members of our own species, that change in public feeling has begun to act in restraint of oppression.

Motive for individual exertion must nevertheless be preserved. It could be dispensed with only in a community in which the component members were in *complete* co-ordination, as the organs of the healthy body are. The only instinct in our race which is sufficiently universal to supply this motive is the desire to accumulate property, generally as a provision for offspring. Other instincts, such as emulation, the altruistic emotions, or the mere love of activity, may all be strongly developed in some, but they are permanent in very few individuals. They are apt to weaken after adolescence, and to disappear as middle age supervenes. But for the institution of property the fibre of the whole community, as at present physiologically constituted, would slacken, and decay must immediately begin. Yet, admitting the principle that if life held no prizes no one would compete, might we not prohibit prizes of such magnitude as to jeopardize the stability of the community? To fix an upper limit on accumulation would not greatly discourage effort, for people will play hard, though the stakes be limited.

Socialism is a state that Nature knows well and has sometimes approved. Yet consider how this approval has been won. Hive bees, for example, are socialists:

the individual worker amasses no property for herself. They defend their hive. Every individual bee that stings you dies in a few hours. But the success of this socialism is founded in the instinctive, almost reflex, devotion of the bees.

Among us we have individuals who develop such feelings for a few years in early youth, and lose them later. A few possess these instincts all their lives. They sacrifice themselves, and but too often others also in their course. Such casual devotion is no base on which to form a social system. All permanent and stable change of institutions is founded in the physiological variation of instinct. In mankind we know a mysterious variation which we call change in fashion or in public opinion. It is to such a variation that constructive socialism must look for its foundation. This is but a slender hope; for that 'public opinion' must take the form of an instinctive, mystic devotion to society, not merely a passion to enjoy the fruits of other men's labour. Of socialistic public opinion in that fuller sense we see few signs.

Observe, too, how even the bees behave under sore temptation. Those who have witnessed the phenomenon of 'robbing' are not likely to forget the experience. If in August or September, when the honey-flow is failing, the bee-keeper drops a comb near his apiary, he knows what to expect. The bees find this honey undefended, easy to seize. They become instantly demoralized. They fight for it at random, stinging and tearing each other to pieces. They charge promiscuously into their neighbours' hives and indescribable pandemonium begins. After such a scene the ground is littered with dead bees in hundreds, and in the bottom of a hive I have seen a layer of bodies an inch or more thick.

Such is the instability of instinct even in the great prototype of socialism, and can we hope that the sight of undefended property would not similarly, in time of scarcity, upset the stability of a socialist State?

But there is still another side to the problem. If nature gives some clear guidance as to the distribution of the means of life, her teaching is even clearer as to the distribution of political power. Socialistic she may sometimes be, but democratic she is not. Turn once more to the physiological facts. 'All men are equal', say certain philosophers. 'That is not true', replies the naturalist. 'Proceed, then, as if it were', urges the statesman, and upon that course we have started. Founded in natural falsehood, the principle of equal rights is at length bearing fruits inevitable, though long deferred. The gift of equal power did not at first disturb the stability of society. Even the able seldom receive a new idea after they are grown up; for the foolish mass that process is then impossible.[1] A generation passes

[1] Herbert Spencer, in many of his strictures on the failure of legislation to achieve its avowed object, makes far too little allowance for the long latent period which often elapses before results appear. Commenting on the fact that laws rarely produce as much direct effect as was expected, and always produce indirect effects (which is all perfectly true), he proceeds to the following illustration, which at the present date reads somewhat naïvely: 'It is so even with fundamental changes: witness the two we have seen in the constitution of our House of Commons. Both advocates and opponents of the first Reform Bill anticipated that the middle classes would select as representatives many of their own body. But both were wrong. The class-quality of the House of Commons remained very much what it was before. While, however, the immediate and special result looked for did not appear, there were vaster remote and general results, foreseen by no one. So, too, with the recent change. We had eloquently-uttered warnings that delegates from the working-classes would swamp the House of Commons; and nearly every one expected that, at any rate, a sprink-

and their children, who learnt of it when young, become aware of the new power, with the consequences we are about to witness.

Of abstract rights, biology knows little: of equal rights, nothing. Philosophers have conceived men born with rights as they are with livers or with spleens. Perhaps they are; but since all those birthrights which can be expressed in terms of health or powers of mind or body are unequal, we find it difficult to suppose that there is some other kind of rights which we possess equally. Some would reply that *equal opportunity* is the right of all. But what use is equal opportunity to those who cannot use the opportunity equally? Either we must waste our strength in creating opportunities for those who cannot profit by them, or by aiming at the lower grades of mankind we deny to the rest the only opportunities which will enable them to develop.

All these familiar ideas will acquire new meaning in

ling of working-class members would be chosen. Again all were wrong.' *The Study of Sociology*, ed. 1908, p. 270.

So again he speaks with great contempt of the legislative efforts to suppress diseases among cattle, which (partly no doubt by the development of greater physiological knowledge) have now been very effective in most cases, and completely successful in many. In 1873 he wrote (*The Study of Sociology*, p. 164): 'Since 1848 there have been seven Acts of Parliament bearing the general titles of Contagious Diseases (Animals) Acts. Measures to "stamp out", as the phrase goes, this or that disease have been called for as imperative. Measures have been passed, and then, expectation not having been fulfilled, amended measures have been passed, and then re-amended measures; so that of late no session has gone by without a bill to cure evils which previous bills tried to cure, but did not. Notwithstanding the keen interest felt by the ruling classes in the success of these measures, they have succeeded so ill, that the "foot-and-mouth disease" has not been "stamped out", has not even been kept in check, but during the past year has spread alarmingly in various parts of the kingdom.'

the light of the new knowledge of the definite composition of individuals; and it would be well, perhaps, if those who are now contemplating a great extension of equal political power to still lower grades of our population would consider how such a proposal reads when translated into physiological terms.

The political reformer claims to raise the standard of a population by thus providing opportunity in ameliorating the conditions of life, and it is worth noting the sense in which his claim is physiologically justified. The gardener by pricking out his seedlings gives them a chance of developing. Left crowded in the seed-pan, none, or very few, will become decent plants. The few successful, if there are any, may owe their success to their special qualities, but more often than not it is determined by mere accident of position near the tally, or against the edge of the pan, where they get most water or light. The botanist knows too that wild plants growing in the competition of a turf or amongst brushwood are usually half-starved. Set out, clear of their kind, or of weeds, many of them can grow to twice the size. So with the crowded masses of humanity. They may, so to speak, be 'potted on'. Given hygienic conditions and better opportunities, they may develop into decent specimens, but they will not turn into better kinds. In the new countries the consequences of this process of planting out can be seen on a very large scale. The emigrants prosper. They are well fed. Except in a few large cities slums do not exist. All can develop; and if we do not expect what the gardener calls 'important novelties' the result is admirable.

It is upon mutational novelties, definite favourable variations, that all progress in civilization and in the control of natural forces must depend. How will *they*

fare in a socialistic community? What stimulus is left to tempt them to exert their powers? In the born discoverer the instinct to find out natural truth is a strong passion, and those who have that feeling will gratify it, just as the artist or the poet works when rejected by the market; but those who invent applications of discoveries are generally thinking of patent-rights, and if none are to be had, they may take life more easily. Is it not certain that all the forces of the community will be invoked against men of extra power? They will be treated as a disturbing nuisance. The progress of modification of a race composed of independent individuals can proceed by variation of individuals, but in a community organized on the principle of equality—if it can be imagined—an individual variation of any magnitude will be either without result or must produce immediate disorganization and disruption.

The ideals therefore of socialism and of democracy are incompatible with each other, and the incompatibility will appear when the period of destruction is over. It is strange that the two words are so commonly associated. 'Social democracy' denotes not one ideal but two. In order that the socialist community should succeed it must have but one mind, as the bees apparently have, not the uncoordinated resultant of all individual minds, which is the ideal of democracy. Until these two coincide, not occasionally only but in some permanent fashion, destruction may proceed but construction cannot begin.

The essential difference between the ideals of democracy and those which biological observation teaches us to be sound, is this: democracy regards class distinction as evil; we perceive it to be essential. It is the heterogeneity of modern man which has given him

his control of the forces of nature. The maintenance of that heterogeneity, that differentiation of members, is a condition of progress. The aim of social reform must be not to abolish class, but to provide that each individual shall so far as possible get into the right class and stay there, and usually his children after him. Men rise from below and fall from above, and the fact is sometimes appealed to as evidence that such vicissitudes are a normal and wholesome phenomenon. The naturalist sees that the convection currents to which such displacements are due must indicate special kinds of disturbance. These disturbances are mainly due to interbreeding between the social grades, and between sections of the population formerly isolated. Such rapid social diffusion must mean either that much original variation is happening, or that extraordinary changes are affecting the conditions of life. There is no doubt that in the case of our own age *both* phenomena can be recognized, but the human variations in mental power are the primary factor, and they have created the disturbance in the conditions of life. Just as the numbers of the population tend always to reach an equilibrium in which births balance deaths, so do the differentiated elements of the population tend always to find their particular level, near which they would stop till the mass is again disturbed.

The fact that families or individuals rose into prominence or dropped into obscurity when the great industrial development of this country began, does not prove that the strains from which they came ought previously and in differing circumstances to have been in different relative positions. In various circumstances various qualities are required for success. It would be useful to illustrate this by actual examples discussed from the biological standpoint, but it will be sufficient to say that

as we have come to recognize that evolutionary change proceeds not by fluctuations in the characters of the mass, but by the predominance of sporadic and special strains possessing definite characteristics, so in a society may previously existing types find their opportunity in the supervention of new social conditions.

When King David said, 'I have been young, and now am old: and yet saw I never the righteous forsaken, nor his seed begging their bread', thus asserting the permanence and heritability of success, he is thought by some to show himself singularly inobservant. But I doubt whether in the Middle Ages or in any other epoch when conditions were comparatively uniform over long periods of time, he would have been regarded as saying anything contrary to general experience.

However that may be, he is declaring what *ought* to be true in an ideal State. We have abolished the Middle Age conception of the State as composed of classes permanently graded, with the ladder of lords rising from the *minuti homines* below to the king on his throne, and yet to such stratification, after each successive disturbance, society tends to return.

But those *minuti homines*, how are they to be contented, for is it not the duty and the desire of all to content them? The first and greatest step towards such contentment is taken when the grades find their right places. At such a time as the present much of the intensity of discontent is due to the fact that some are at the bottom who should be higher, while some are high who should be lower. For time is of the essence of the process; and two generations have scarcely passed since the great changes began. Then, strange as it may seem, content is not so very rare after all. There is a discontent which is caused not because

something is withheld from us, but because we know our own inferiority; for that there is no cure. Decent food and lodging, however, go far to satisfy *minuti homines* in general. Very early most of us accept the truth of Schumann's aphorism, that if every one were determined to play first fiddle no orchestra could be got together.

As a boy in Cambridge I learnt that if a man got a first class he might be happy; if he got a second class he would be unhappy; if he got a third class, nothing but misery and a colonial life awaited him. When we grow older we unlearn these simple propositions, and we find that happiness is in many cases compatible with weekly wages and even with a pass degree. Some will have more than others. As in the body the heart is arranged so that the best blood goes to the head, so must and ought it to be with society.

Whatever is doubtful, this much I think is certain, that we are fast nearing one of those great secular changes through which history occasionally passes. The present social order is too unstable to last much longer, and he must be callous who greatly desires that it should. What will emerge from the approaching histolysis no one can predict. Let us hope, something better: and to this end may those upon whom devolves the duty of rearing that new organism, which is to grow from the dissolved tissues of society, be guided in their treatment, like physicians of the modern age, not by nostrum merely, but by the facts of natural physiology.

BIOLOGICAL FACT
AND THE
STRUCTURE OF SOCIETY

THE HERBERT SPENCER LECTURE

DELIVERED AT THE EXAMINATION SCHOOLS
ON WEDNESDAY, FEBRUARY 28, 1912

BY

W. BATESON, M.A., F.R.S.

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